IN THE SPECIFICATION:

1. Please replace page 1 with the following text:

A DECODER FOR A WIRELESS COMMUNICATION DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of United Kingdom patent application no. 0328322.3.

FIELD OF THE INVENTION

The present invention relates to a decoder for a wireless communication device.

BACKGROUND OF THE INVENTION

Wireless communication systems are widely deployed to provide various types of communications such as voice and data. One such system is wideband code division multiple access WCDMA, which has been adopted in various competing wireless communication standards, for example 3rd generation partnership project 3GPP and 3GPP2.

To overcome data corruption that can occur during RF transmission the different wireless communication standards typically include some form of channel coding, where one common channel coding technique is turbo coding.

Turbo coding involves the use of a turbo encoder for encoding a code segment (i.e. a data packet) and a turbo decoder for the decoding of the encoded code segment.

A turbo encoder includes two convolutional encoders and an interleaver, where the interleaver shuffles (i.e. interleaves) the information bits in the packet in accordance with a specified interleaving scheme.

The turbo encoder uses a first convolutional encoder to encode information bits within a packet to generate a first sequence of parity bits in parallel to the interleaver shuffling the information bits, where the shuffled information bits are encoded by a second encoder to generate a second sequence of parity bits. The information bits and the parity bits in the first and second sequence are then modulated and transmitted to a receiver.

2. Please replace page 4 with the following text:

An alternative implementation of the modulo function can be defined by: xmodF = $x-2F\left\lfloor\left(\frac{x+F}{2F}\right)\right\rfloor$, which allows negative numbers to be accommodated. This function is illustrated in figure 2.

It is desirable to have an apparatus and method for generating a linearly approximated MAX* log MAP algorithm that operates on modulo functions.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example, with reference to the drawings, of which:

Figure 1 illustrates a graphical representation of a first modulo function;

Figure 2 illustrates a graphical representation of a second modulo function;

Figure 3 illustrates a graphical representation of the variation in the MAX* correction term versus $|a(n)-b(n)|$;

Figure 4 illustrates a decoder according to an embodiment of the present invention.

3. Please replace page 5 with the following text:

DETAILED DESCRIPTION

The curve A in figure 3 illustrates the correction term for the MAX*(a(n),b(n)) function (i.e. MAX*(a(n),b(n)-MAX(a(n),b(n)) as a function of $|a(n)-b(n)|$), where $|a(n)-b(n)|$ is the absolute value of the difference between a(n) and b(n)).

As can be seen from curve A the correction term is greatest for low values of $|a(n)-b(n)|$ and gradually decreases to zero as $|a(n)-b(n)|$ increases.

As stated above, an easy technique for approximating the correction term is the use of linear approximation, as illustrated by line B in figure 3. As illustrated, the linear approximation provides a close approximation for the correction term for low values of $|a(n)-b(n)|$. The intersection of the line B on the $|a(n)-b(n)|$ axis indicates the $|a(n)-b(n)|$ value above which the linear approximation correction term goes to zero. Consequently, using linear approximation, the intersection point determines a threshold value, designated C, for determining if a correction value is to be applied to $|a(n)-b(n)|$, where the intersection point is defined by the linear approximation equation.

The use of the linear approximation technique allows easy calculation of the MAX* function, as described below.

One suitable linear approximation equation (i.e. the correction term used) is given by MAX(0, $(C-|a(n)-b(n)|)/2$).

Consequently, the MAX* function can be written as:

MAX(a(n),b(n)) + MAX(0, $(C-|a(n)-b(n)|)/2$)